REMARKS

The foregoing Amendment amends claim 1, 4, 7, 10 and 12. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance.

Claims 1-13 are currently pending and under consideration in the present application. Each of the independent claims has been amended to emphasize that the flow amount and/or temperature are controlled to supply the cooling medium to the gas/liquid separator depending on the changes in the amount of the water.

Art Rejection

The Examiner initially rejects claims 1-4, 7, 8 and 10-13 under 35 U.S.C. 102(b) as being anticipated by JP6-176784. For the reasons set forth below, Applicant respectfully submits that the amended define patentably over the cited '784 reference.

The '784 Japanese reference is the background prior art acknowledged on pages 2 and 3 of the present specification. We need not repeat the comments in the present specification, however, it should be noted that JP6-176784 relates to a phosphoric acid fuel cell employing a phosphoric acid electrolyte. The principle object of the JP6-176784 is to *extend* the service life of the ion exchange resin by removing phosphoric acid in the recovered water.

The temperature of cooling water for the condensation heat exchanger changes depending on the changes of the air temperature. For example, the temperature of cooling water is low during the winter season. Therefore, the heat exchange performed by the condensation heat exchanger is increased, and the amount of recovered water is increased. Since the amount of phosphoric acid removed by the ion exchange treatment device tends to be excessively large, action for neutralization of phosphoric ion is not sufficient, and thus, the service life of the ion-exchange resin is short.

In order to solve the above problem, the JP6-176784 requires that the cooling water temperature supplied to the condensation heat exchanger be kept constant. In this manner, the amount of the heat exchange of the condensation heat exchanger is kept constant, and the amount of the water which is recovered by the condensation heat exchanger and which is purified by the ion exchange treatment device is kept constant.

Moreover, the '784 reference teaches that the flow rate of cooling water supplied to the condensation heat exchanger is controlled depending on the temperature of cooling water supplied to the condensation heat exchanger, so that the amount of heat exchange by the condensation heat exchanger, and the amount of *water which is recovered* by the condensation heat exchanger and which is purified by the ion exchange treatment device, are kept *constant.*

In contrast, as set forth in independent claims 1, 4, 7, 10, and 12, the amount of water recovered in the claimed fuel cell system changes or varies depending on the operational condition of the fuel cell, and is thus not kept constant as taught by the '784 reference. For example, when the fuel cell is operated at high power, the amount of recovered water (condensed water) is large. As the temperature at the outlet port of the gas/liquid separator increases, the amount of recovered water (condensed water) decreases. When the temperature of cooling water is high, the amount of recovered water is small. Consequently, in a polymer electrolyte fuel cell using a *solid polymer electrolyte*, the amount of condensed water is *not kept constant*, and *changes* depending on the operation condition of the fuel cell.

The present invention controls the flow rate of the cooling medium at an optimized level depending on the operation condition of the fuel cell, and on the amount of the condensed water, which *changes* depending on the operation condition of the fuel cell.. The claimed invention is patentably different than the prior art technique decribed in the '784 reference, which seeks to keep the amount of water recovered by the condensation heat exchanger at a *constant level.* Moreover, with the present invention, the electricity (pumping current) consumed by the pump is effectively reduced.

Applicants also respectfully submit that the present invention relates to a *polymer electrolyte* fuel cell employing a solid polymer electrolyte. The solid polymer electrolyte fuel cell is completely different that the phosphoric acid fuel cell taught in the '784 reference. The concept of the present invention greatly differs from that of JP6-176784 which relates to phosphoric acid fuel cell.

Conclusion

For the foregoing reasons, Applicants contend that that amended claims define over the cited art. The cited art does not teach controlling the flow rate of a cooling fluid as a function of the recoverd (condensed) water, , which *changes* depending on the operation condition of the fuel cell..

If there are any remaining issues, an opportunity for an interview is requested prior to the issuance of another Office Action. If the above amendments are not deemed to place this case in condition for allowance, the Examiner is urged to call Applicants' representative at the telephone number listed below.

Respectfully submitted,

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LAHIVE & COCKFIELD, LLP
Attorneys at Law

By Anthony Laurentano
Anthony A. Laurentano
Reg. No. 38,220
28 State Street
Boston, MA 02109
(617) 227-7400
(617) 742-4214

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Please amend claims 1, 4, 7, 10, and 12 as follows:

1. (Amended) A fuel cell system provided with a fuel cell including an anode electrode disposed opposingly with an electrolyte interposed there between, for obtaining electromotive force by supplying fuel gas containing hydrogen to said anode electrode while supplying oxygen-containing gas containing oxygen to said cathode electrode, said fuel system comprising:

a gas/liquid separator for separating discharged components discharged from said fuel cell into gas components and water, an amount of said water being changed depending on an operation condition of said fuel cell ~~so that said water is recovered~~; and

a flow rate control unit for controlling a flow rate of a cooling medium supplied to said gas/liquid separator for performing heat exchange with said discharged components,

wherein the flow rate of said cooling medium is controlled depending on the amount of said water. ~~an operation condition of said fuel cell.~~

4. (Amended) A fuel cell system provided with a fuel cell including an anode electrode and a cathode electrode disposed opposingly with an electrolyte interposed therebetween, for obtaining electromotive force by supplying fuel gas containing hydrogen to said anode electrode while supplying oxygen-containing gas containing oxygen to said cathode electrode, said fuel cell system comprising:

a gas/liquid separator for separating discharged components discharged from said fuel cell into gas components and water, an amount of said water being changed depending on an operation condition of said fuel cell ~~so that said water is recovered~~; and

a temperature control unit for controlling a temperature of a cooling medium supplied to said gas/liquid separator for performing heat exchange with said discharged components,

wherein the temperature of said cooling medium is controlled depending on the amount of said water. ~~an operation condition of said fuel cell.~~

7. (Amended) A fuel system provided with a fuel cell including an anode electrode and a cathode electrode disposed opposingly with an electrolyte interposed therebetween, for obtaining electromotive force by supplying fuel gas containing hydrogen to said anode electrode while supplying oxygen-containing gas containing oxygen to said cathode electrode, said fuel cell system comprising:

a gas/liquid separator for separating discharged components discharged from said fuel cell into gas components and water, an amount of said water being changed depending on an operation condition of said fuel cell ~~so that said water is recovered~~; and

a flow rate control unit for controlling a flow rate of a cooling medium supplied to said gas/liquid separator for performing heat exchange with said discharged components, the flow rate of said cooling medium being controlled depending on the amount of said water ~~an operation condition of said fuel cell~~; and

a temperature control unit for controlling a temperature of a cooling medium depending on the amount of said water. ~~said operation condition of said fuel cell.~~

10. (Amended) A gas/liquid separation method for a fuel cell system for supplying, to a gas/liquid separator, discharged components discharged from a fuel cell including an anode electrode and a cathode electrode disposed opposingly with an electrolyte interposed therebetween, and separating said discharged components into gas components and water, an amount of said water being changed depending on an operation condition of said fuel cell, said method comprising the steps of:

detecting ~~an operation condition~~ changes in the amount of said water ~~of said detected fuel cell~~; and

controlling a flow rate of a cooling medium supplied to said gas/liquid separator for performing heat exchange with said discharged components, depending on said ~~operation condition~~ changes in the amount of said water ~~of said detected fuel cell~~.

12. (Amended) A gas/liquid separation method for a fuel cell system for supplying, to a gas/liquid separator, discharged components from a fuel cell including an anode electrode and a cathode electrode disposed opposingly with an electrolyte interposed therebetween, and separating said discharged components into gas components and water, an amount of said water being changed depending on an operation condition of said fuel cell, said method comprising the steps of:

detecting ~~an operation condition~~ changes in the amount of said water ~~of said fuel cell~~; and

controlling a temperature of a cooling medium supplied to said gas/liquid separator for performing heat exchange with said discharged components, depending on said ~~detected operation condition~~ changes in the amount of said water ~~of said fuel cell~~.